REMARKS

In the present Amendment, Claim 1 has been amended to specifically define the intermediate layer, and to further recite that the coating material is a composite material which comprises 50% or more of $Mo(Si_{1-x}Al_x)_2$ on a volume percent basis wherein x is from 0.05 to 0.6. These amendments are supported by the specification, for example, Paragraph Nos. [0022], [0027], [0040] and [0053], Figure 1, and Paragraph Nos. [0066] and [0069]. Claim 1 has also been amended for clarity.

Claims 15-20 have been added. Claims 15-20 are supported by the specification, for example, Paragraph Nos. [0066], [0067], [0069], [0035] and [0037].

Claims 5-7 and 10-14 have been canceled.

No new matter has been added and entry of the Amendment is respectfully requested. Upon entry of the Amendment, Claims 1-4, 8-9 and 15-20 will be all the claims pending in the application.

I. Response to Rejection Under 35 U.S.C. § 112

In Paragraph No. 2 of the Office Action, Claims 1-14 have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite.

Specifically, the Examiner noted (i) that in Claim 1, the relationship between the intermediate layer, oxide layer and the coating layer is unclear; and (ii) that Claims 8 and 9, which recite "The coating material according to Claim 1" is improper because Claim 1 recites a method.

Applicants respectfully submit that the amended claims are not indefinite. As noted above, Applicants have amended Claim 1 to specifically define the relationship between the substrate, the intermediate oxide layer and the coating layer. In addition, Applicants have amended Claims 8 and 9 to replace "The coating material" with --The method for forming a film--. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection.

II. Response to Rejection Under 35 U.S.C. § 102

In Paragraph No. 4 of the Office Action, Claims 1, 2, 4-6 and 12 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Good et al (U.S. Pat. No. 3,928,906).

Applicants respectfully submit that the present claims are novel over Good et al for at least the following reasons.

Good et al discloses a thin, compliant seal for a regenerator of a gas turbine engine or the like wherein a transition coating is applied to a lightly oxidized surface of a relatively thin substrate element (Abstract). In Good et al, nickel aluminide (NiAl) was used as the transition coating material (col. 6, lines 1-2 and 39-40).

In contrast, in the present invention, the coating material is a composite material which comprises 50% or more of $Mo(Si_{1-x}Al_x)_2$ on a volume percent basis, wherein x is from 0.05 to 0.6. Good et al does not disclose the presently claimed coating material.

Moreover, $Mo(Si_{1-x},Al_x)_2$ of the present invention has a significantly smaller coefficient of thermal expansion than that of NiAl disclosed in Good et al, and substantially the same coefficient of thermal expansion as that of the intermediate aluminum oxide layer to be formed

as a reaction prevention layer (intermediate layer). Thus, thermal stress generated between the intermediate aluminum oxide layer and the coating layer during heat cycle can be significantly reduced, compared to a case using NiAl. As a result, durability of the coating is remarkably improved.

In the present invention, the intermediate aluminum oxide layer to be formed not only serves as a reaction prevention layer, but also serves as a diffusion prevention layer which prevents mutual diffusion of component elements in the substrate or the coating layer during subsequent use at high temperatures for a long period of time. The intermediate aluminum oxide layer is formed through a reaction, thus strongly bonded, and has a very stable structure. The intermediate aluminum oxide layer does not change once it is formed.

Further, the coating structure according to the present invention can be used at even higher temperatures. In this regard, some novel heat resistant materials, for example, an Nb-base material used as a substrate in Examples of the specification of the present application, or a W-, Ta- or Mo-base material, which have higher heat resistant temperatures than that of an Ni-base superalloy and may replace the Ni-base superalloy, have the same or smaller coefficient of thermal expansion than that of aluminum oxide. The present invention provides a coating structure with oxidation resistance, which is appropriate for the material.

Accordingly, Applicants respectfully submit that Good et al does not anticipate or render obvious the present invention and that the rejection should be withdrawn.

III. Response to Rejection Under 35 U.S.C. § 103

In Paragraph No. 7 of the Office Action, Claims 1-7 and 10-14 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tzatzov et al (US 2002/0192494) in view of Good et al.

Applicants respectfully submit that the present claims are patentable over Tzatzov et al in view of Good et al for at least the following reasons.

Tzatzov et al discloses a method for protecting stainless steel by coating the stainless steel with MCrAlXSiT, in which M is Ni, Co, Fe or a mixture thereof, X is Y, Hf, Ze, La, Sc or a mixture thereof, and T is Ta, Ti, Pt, Pd, Rh, Mo, W, Nb, B or a mixture thereof (Abstract). Tzatzov et al further discloses that a MCrAlXSiT alloy contains about 0-40 wt % Cr, about 3-30 wt % aluminum, up to 5 wt % X, 0-40 wt % Si, up to about 10 wt % T and the balance M, i.e., the MCrAlXSiT alloy has the formula of $M_{balance}Cr_{0\text{-}40\ wt\ \%}Al_{3\text{-}30\ wt\ \%}X_{0\text{-}5\ wt\ \%}Si_{0\text{-}40\ wt\ \%}T_{0\text{-}10\ wt\ \%}$.

That is, even if that T in the alloy of Tzatzov et al is Mo, the alloy would have at most 10 wt% of Mo. In contrast, $Mo(Si_{1-x}Al_x)_2$ in the present invention contains 60 wt% or more of Mo. For this reason, the alloy of Tzatzov et al does not satisfy the requirements of $Mo(Si_{1-x}Al_x)_2$ recited in the present claims.

Further, the alloy of Tzatzov et al contains M or Cr as main components. In contrast, $Mo(Si_{1-x}Al_x)_2$ of the present invention does not contain M or Cr.

Good et al does not rectify the deficiencies of Tzatzov et al.

Accordingly, even if there might be motivation to combine Tzatzov et al with Good et al, the combination still would not result in the present invention which contains $Mo(Si_{1-x}Al_x)_2$.

In view of the foregoing, Applicants respectfully submit that the present invention is not obvious over Tzatzov et al in view of Good et al and that the rejection should be withdrawn.

IV. Allowable Subject Matter

In Paragraph No. 8 of the Office Action, it is indicated that Claims 8 and 9 contain allowable subject matter.

Applicants respectfully submit that the § 112 rejection of Claims 8 and 9 has been overcome as set forth above and thus Claims 8 and 9 are now in condition for allowance.

V. Claims 15-20

Applicants respectfully submit that newly added Claims 15-20 are novel and patentable over the cited references, because none of the cited references disclose or suggest the specific composition recited in Claims 15-20.

VI. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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